Algebra Development in Common Core Standards Grade 6-12

**Overview**

**Grade 6**

Expressions and Equations (See page 43-44)

• Apply and extend previous understandings of arithmetic to algebraic expressions.

• Reason about and solve one-variable equations and inequalities.

• Represent and analyze quantitative relationships between dependent and independent

variables.

**Grade 7**

Expressions and Equations (See page 49)

• Use properties of operations to generate equivalent expressions.

• Solve real-life and mathematical problems using numerical and algebraic expressions

and equations.

**Grade 8**

Expressions and Equations (See page 54-55)

• Work with radicals and integer exponents.

• Understand the connections between proportional relationships, lines, and linear

equations.

• Analyze and solve linear equations and pairs of simultaneous linear equations.

Functions (See page 55)

• Define, evaluate, and compare functions.

• Use functions to model relationships between quantities.

**Algebra** (page 64-68)

Seeing Structure in Expressions

• Interpret the structure of expressions

• Write expressions in equivalent forms to solve problems

Arithmetic with Polynomials and Rational Expressions

• Perform arithmetic operations on polynomials

• Understand the relationship between zeros and factors of polynomials

• Use polynomial identities to solve problems

• Rewrite rational expressions

Creating Equations

• Create equations that describe numbers or relationships

Reasoning with Equations and Inequalities

• Understand solving equations as a process of reasoning and explain the reasoning

• Solve equations and inequalities in one variable

• Solve systems of equations

• Represent and solve equations and inequalities graphically

**Functions** (See page 69-71)

Interpreting Functions

• Understand the concept of a function and use function notation

• Interpret functions that arise in applications in terms of the context

• Analyze functions using different representations

Building Functions

• Build a function that models a relationship between two quantities

• Build new functions from existing functions

Linear, Quadratic, and Exponential Models

• Construct and compare linear, quadratic, and exponential models and solve problems

• Interpret expressions for functions in terms of the situation they model

Trigonometric Functions

• Extend the domain of trigonometric functions using the unit circle

• Model periodic phenomena with trigonometric functions

• Prove and apply trigonometric identities

**From Geometry Standards**

**Similarity, Right Triangles, and Trigonometry G-SRT** (See page 77)

Define trigonometric ratios and solve problems involving right triangles

6. Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.

7. Explain and use the relationship between the sine and cosine of complementary angles.

8. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.★

Apply trigonometry to general triangles

9. (+) Derive the formula A = 1/2 ab sin(C) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.

10. (+) Prove the Laws of Sines and Cosines and use them to solve problems.

11. (+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).

**Expressing Geometric Properties with Equations G-GPE** (See page 78)

Translate between the geometric description and the equation for a conic section

1. Derive the equation of a circle of given center and radius using the

Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.

2. Derive the equation of a parabola given a focus and directrix.

3. (+) Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant.

Use coordinates to prove simple geometric theorems algebraically

4. Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, **√**3) lies on the circle centered at the origin and containing the point (0, 2).

5. Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).

6. Find the point on a directed line segment between two given points that partitions the segment in a given ratio.

7. Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.**★**

**From Statistics and Probability Standards**

**Interpreting Categorical and Quantitative Data S-ID** (page 81)

Summarize, represent, and interpret data on two categorical and quantitative variables

5. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.

6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.

a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.

b. Informally assess the fit of a function by plotting and analyzing residuals.

c. Fit a linear function for a scatter plot that suggests a linear association. Interpret linear models

7. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.

8. Compute (using technology) and interpret the correlation coefficient of a linear fit.

9. Distinguish between correlation and causation.

Tables page 90:

